

Spencer Bandi

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EDUCATION

Brigham Young University

PhD Candidate, Chemical Engineering

Focus: Combustion, ash behavior, process design, process control and emissions reduction

Present

Provo, UT

Harare Institute of Technology

Bachelor of Technology (BTech), Chemical and Process Systems Engineering

June 2019

Harare, Zimbabwe

PROJECTS /RESEARCH

Dissertation

August 2020 – Present

- Investigation of Biomass Fuel Processing and Ash Behavior to Support the Conversion of Coal-Fired Boilers into Biomass Combustors for Achieving Net-Negative CO₂ Emissions

Publications

- Synergistic Reduction of SO₂ Emissions While Co-Firing Biomass with Coal in Pilot-scale (1.5 MWth) and full-scale (471 MWe) combustors. *Fuel Journal*, February 15, 2024
- Steam Explosion Treated Biomass as a Renewable Fuel Source: A Review from Collection to Combustion. *Fuel Journal*, 2024

Presentation

- Optimizing Ash Fusion Temperatures in Biomass Combustion: An Investigation of Additive Effects. *Clearwater Clean Energy Conference*, June 19, 2024

EXPERIENCE

Research Assistant

August 2020 – Present

- Led design, instrumentation, and automation of a 150-kW combustion reactor process, using Opto 22 Groove EPIC for real-time control and data acquisition
- Executed combustion trials with natural gas, coal, and multiple biomass fuels (switchgrass, miscanthus, corn stover), simulating industrial-scale furnace conditions
- Modeled ash fusion temperatures (AFTs) using FactSage, improving fuel formulation to reduce slagging and optimize combustion efficiency
- Designed Process Flow Diagrams (PFDs) and P&IDs, calibrated sensors, and validated system performance under dynamic conditions
- Measured and analyzed flue gas emissions (CO, CO₂, NO_x, SO₂, O₂), informing strategies to meet regulatory targets and minimize environmental impact
- Conducted biomass milling and preprocessing studies to optimize particle size distributions for efficient combustion

National Foods Limited Zimbabwe

May 2018 – August 2020

Production Planner

Harare, Zimbabwe

- Developed and executed weekly production schedules for over 2,000 tons of animal feed, managing more than 80 unique SKUs to meet customer demand across diverse market segments
- Coordinated with procurement, maintenance, production and quality assurance teams to optimize production workflows, minimize downtime, and improve plant efficiency.

AWARDS

- John L. Oscarson Excellence in Citizenship Award – For leadership in research, teaching, and department culture, BYU Chemical Engineering Department (2024–2025)

SKILLS

- Combustion & Thermal Systems – Biomass, coal, and natural gas systems
- Process Design & Control – PFDs, P&IDs, instrumentation, wiring, and control loop tuning
- Process Instrumentation – Opto 22, sensor calibration, emissions monitoring
- Simulation – FactSage (AFTs prediction)
- Data Analysis and Reporting – Excel, Python
- Software/ Program – Microsoft Office, Python, FactSage, PAC Display, PAC Control